FCC 47 CFR PART 15 SUBPART C
INDUSTRY CANADA RSS-210 ISSUE 8

BLUETOOTH LOW ENERGY
CERTIFICATION TEST REPORT

FOR

LTE PHONE BLUETOOTH, WLAN (2.4GHZ & 5GHZ) AND NFC

MODEL NUMBER: LG-D500, LGD500, D500, LGMS500, LG-MS500, MS500

FCC ID: ZNFD500

REPORT NUMBER: 13U15216-4, Revision A

ISSUE DATE: July 12, 2013

Prepared for
LG ELECTRONICS MOBILECOMM U.S.A., INC.
1000 SYLVAN AVENUE
ENGLEWOOD CLIFFS, NEW JERSEY 07632

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NVLAP LAB CODE 200065-0

Revision History

Rev.	Issue Date	Revisions	Revised By
--	06/24/13	Initial Issue	P. Kim
A	07/12/13	Updated the Max Power table, 5.2	P. Kim

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1. ATTESTATION OF TEST RESULTS

COMPANY NAME:	LG ELECTRONICS MOBILECOMM U.S.A., INC. 1000 SYLVAN AVENUE ENGLEWOOD CLIFFS, NEW JERSEY 07632
EUT DESCRIPTION:	LTE PHONE BLUETOOTH, WLAN (2.4GHZ & 5GHZ) AND NFC
MODEL:	LG-D500, LGD500, D500, LGMS500, LG-MS500, MS500
SERIAL NUMBER:	303KPHG337169
DATE TESTED:	MAY 14, 2013

APPLICABLE STANDARDS	
STANDARD	**TEST RESULTS**
CFR 47 Part 15 Subpart C	Pass
INDUSTRY CANADA RSS-210 Issue 8 Annex 8	Pass
INDUSTRY CANADA RSS-GEN Issue 3	Pass

UL Verification Services Inc. tested the above equipment in accordance with the requirements set forth in the above standards. All indications of Pass/Fail in this report are opinions expressed by UL Verification Services Inc. based on interpretations and/or observations of test results. Measurement Uncertainties were not taken into account and are published for informational purposes only. The test results show that the equipment tested is capable of demonstrating compliance with the requirements as documented in this report.

Note: The results documented in this report apply only to the tested sample, under the conditions and modes of operation as described herein. This document may not be altered or revised in any way unless done so by UL Verification Services Inc. and all revisions are duly noted in the revisions section. Any alteration of this document not carried out by UL Verification Services Inc. will constitute fraud and shall nullify the document. This report must not be used by the client to claim product certification, approval, or endorsement by NVLAP, NIST, any agency of the Federal Government, or any agency of any government.

Approved & Released For
UL Verification Services Inc. By:

PHILIP KIM
WiSE PROGRAM MANAGER
UL Verification Services Inc.

Tested By:

MENGISTU MEKURIA
WiSE ENGINEER
UL Verification Services Inc.

2. TEST METHODOLOGY

The tests documented in this report were performed in accordance with ANSI C63.10-2009, FCC CFR 47 Part 2, FCC CFR 47 Part 15, RSS-GEN Issue 3, and RSS-210 Issue 8.

3. FACILITIES AND ACCREDITATION

The test sites and measurement facilities used to collect data are located at 47173 Benicia Street, Fremont, California, USA.

UL Verification Services Inc. is accredited by NVLAP, Laboratory Code 200065-0. The full scope of accreditation can be viewed at http://www.ccsemc.com.

4. CALIBRATION AND UNCERTAINTY

4.1. MEASURING INSTRUMENT CALIBRATION

The measuring equipment utilized to perform the tests documented in this report has been calibrated in accordance with the manufacturer's recommendations, and is traceable to recognized national standards.

4.2. SAMPLE CALCULATION

Where relevant, the following sample calculation is provided:

Field Strength (dBuV/m) = Measured Voltage (dBuV) + Antenna Factor (dB/m) + Cable Loss (dB) – Preamp Gain (dB)
36.5 dBuV + 18.7 dB/m + 0.6 dB – 26.9 dB = 28.9 dBuV/m

4.3. MEASUREMENT UNCERTAINTY

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the apparatus:

PARAMETER	UNCERTAINTY
Conducted Disturbance, 0.15 to 30 MHz	3.52 dB
Radiated Disturbance, 30 to 1000 MHz	4.94 dB

Uncertainty figures are valid to a confidence level of 95%.

5. EQUIPMENT UNDER TEST

5.1. DESCRIPTION OF EUT

The EUT is LTE phone supports BLUETOOTH, WLAN (2.4GHZ & 5GHZ) AND NFC

5.2. MAXIMUM OUTPUT POWER

The transmitter has a maximum peak conducted output power as follows:

Frequency Range (MHz)	Output Power (dBm)	Output Power (mW)
2402	8.10	6.46
2440	7.42	5.52
2480	7.75	5.96

5.3. DESCRIPTION OF AVAILABLE ANTENNAS

The radio utilizes an Inverted F antenna, with a maximum gain of 1.04 dBi.

5.4. SOFTWARE AND FIRMWARE

The firmware installed in the EUT during testing was 4.1.2
The test utility software used during testing was D500_LAP8930JR130328.

5.5. WORST-CASE CONFIGURATION AND MODE

Radiated emission and power line conducted emission were performed with the EUT set to transmit at the channel with highest output power as worst-case scenario.

The fundamental of the EUT was investigated in three orthogonal orientations X,Y,Z, it was determined that Y orientation was worst-case orientation; therefore, all final radiated testing was performed with the EUT in Y orientation.

5.6. DESCRIPTION OF TEST SETUP

SU SUPPORT EQUIPMENT

Support Equipment List				
Description	Manufacturer	Model	Serial Number	FCC ID
AC Adapter	LG	MCS-01WR	RB320071516	DoC
Earphone	Cresyn	EAB62410801	N/A	N/A

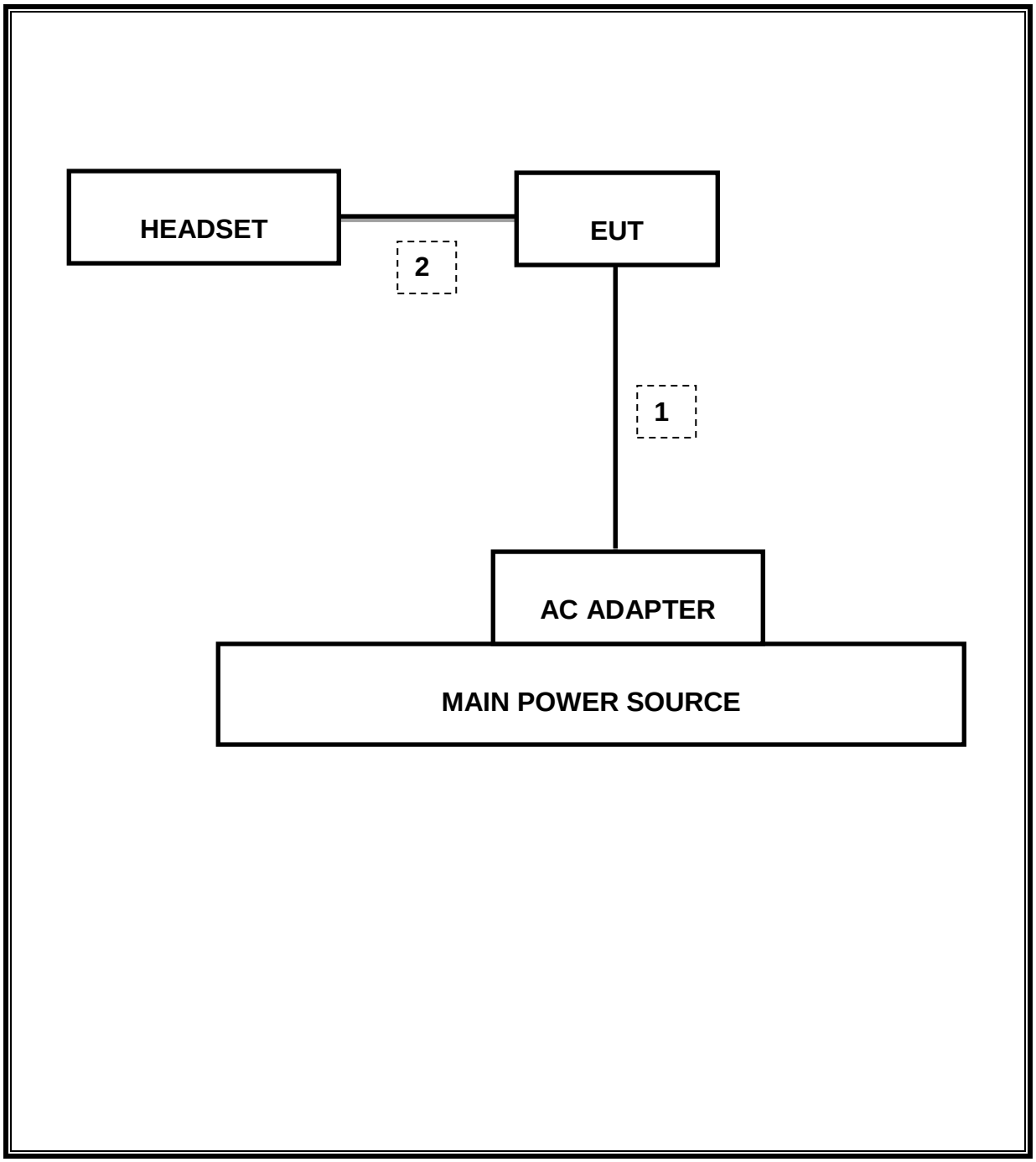
I/O CABLES

I/O Cable List						
Cable No	Port	# of identical ports	Connector Type	Cable Type	Cable Length (m)	Remarks
1	DC Power	1	Mini-USB	Shielded	1.2m	N/A
2	Audio	1	Mini-Jack	Unshielded	1m	N/A

TEST SETUP

The EUT is continuously communicating to the Bluetooth tester during the tests.
EUT was set in the Hidden menu mode to enable BT communications.

SETUP DIAGRAM FOR TESTS



6. TEST AND MEASUREMENT EQUIPMENT

The following test and measurement equipment was utilized for the tests documented in this report:

Test Equipment List				
Description	**Manufacturer**	**Model**	**Asset**	**Cal Due**
Antenna, Biconolog, 30MHz-1 GHz	Sunol Sciences	JB1	C01171	02/13/14
Antenna, Horn, 18GHz	EMCO	3115	C00783	10/25/13
Antenna, Horn, 25.5 GHz	ARA	MWH-1826/B	C00980	11/14/13
Preamplifier, 1300 MHz	Agilent / HP	8447D	C00580	01/28/14
Preamplifier, 26.5 GHz	Agilent / HP	8449B	C01052	10/22/13
Peak Power Meter	Agilent / HP	E4416A	C00963	12/13/13
Peak / Average Power Sensor	Agilent / HP	E9327A	C00964	12/13/13
LISN, 30 MHz	FCC	50/250-25-2	C00626	01/14/14
Reject Filter, 2.4GHz	Micro-Tronics	BRM50702	N02684	CNR

7. RADIATED TEST RESULTS

7.1. LIMITS AND PROCEDURE

LIMITS

FCC §15.205 and §15.209

IC RSS-210 Clause 2.6 (Transmitter)

IC RSS-GEN Clause 6 (Receiver)

Frequency Range (MHz)	Field Strength Limit (uV/m) at 3 m	Field Strength Limit (dBuV/m) at 3 m
30 - 88	100	40
88 - 216	150	43.5
216 - 960	200	46
Above 960	500	54

TEST PROCEDURE

The EUT is placed on a non-conducting table 80 cm above the ground plane. The antenna to EUT distance is 3 meters. The EUT is configured in accordance with ANSI C63.4. The EUT is set to transmit in a continuous mode.

For measurements below 1 GHz the resolution bandwidth is set to 100 kHz for peak detection measurements or 120 kHz for quasi-peak detection measurements. Peak detection is used unless otherwise noted as quasi-peak.

For measurements above 1 GHz the resolution bandwidth is set to 1 MHz, then the video bandwidth is set to 1 MHz for peak measurements and 10 Hz for average measurements.

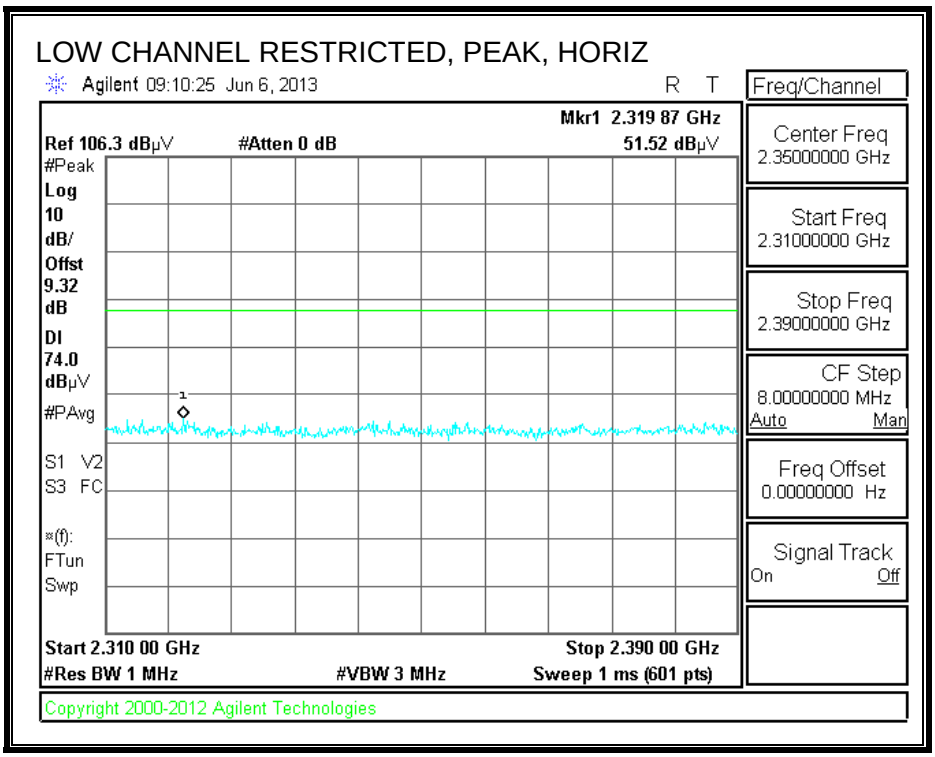
The spectrum from 30 MHz to 26 GHz is investigated with the transmitter set to the lowest, middle, and highest channels in the 2.4 GHz band.

The spectrum from 30 MHz to 40 GHz is investigated with the transmitter set to the lowest, middle, and highest channels in each applicable band.

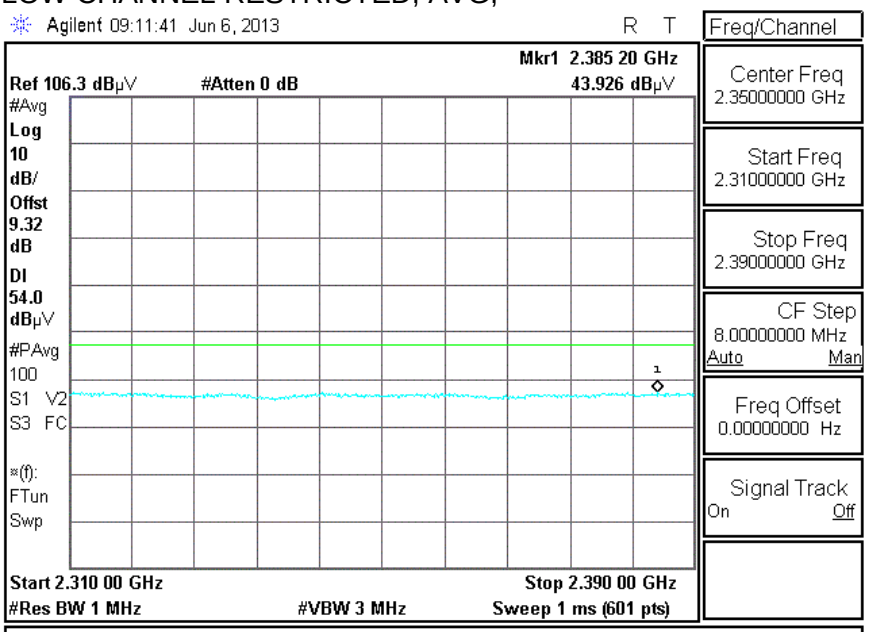
The frequency range of interest is monitored at a fixed antenna height and EUT azimuth. The EUT is rotated through 360 degrees to maximize emissions received. The antenna is scanned from 1 to 4 meters above the ground plane to further maximize the emission. Measurements are made with the antenna polarized in both the vertical and the horizontal positions.

7.2. TX ABOVE 1 GHz FOR BLUETOOTH LOW ENERGY MODE

RESTRICTED BANDEDGE (LOW CHANNEL, HORIZONTAL)

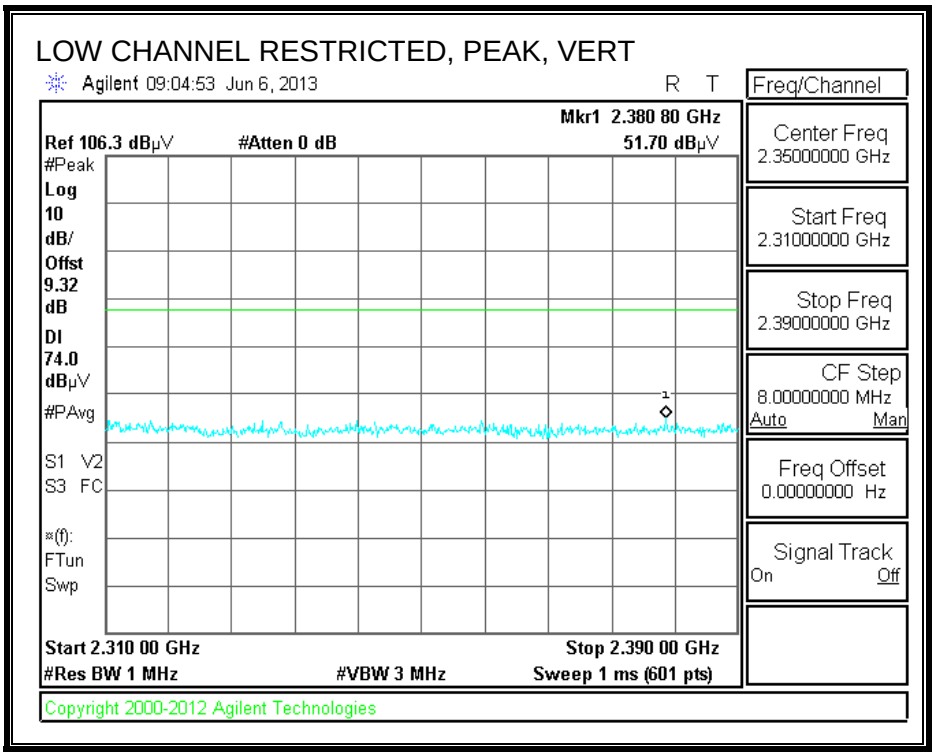


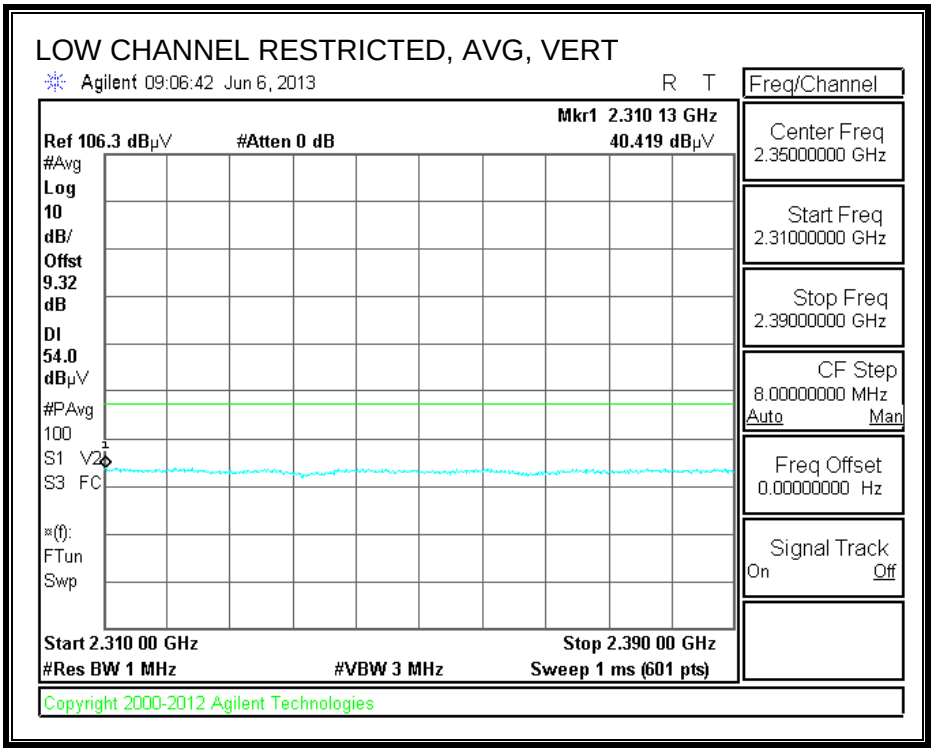
LOW CHANNEL RESTRICTED, AVG,



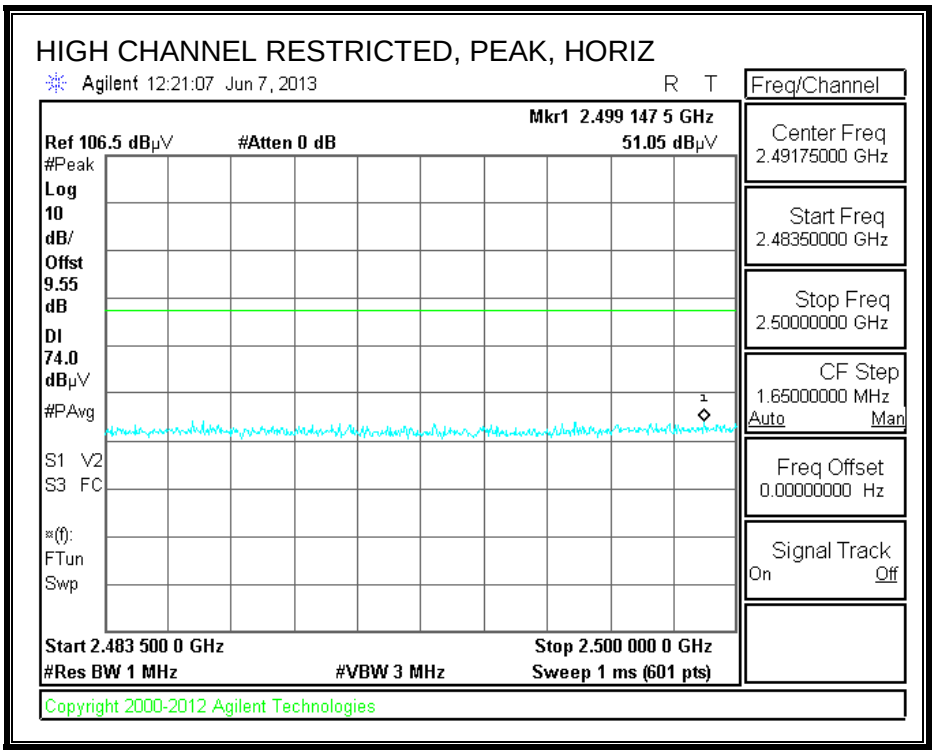
HORIZ

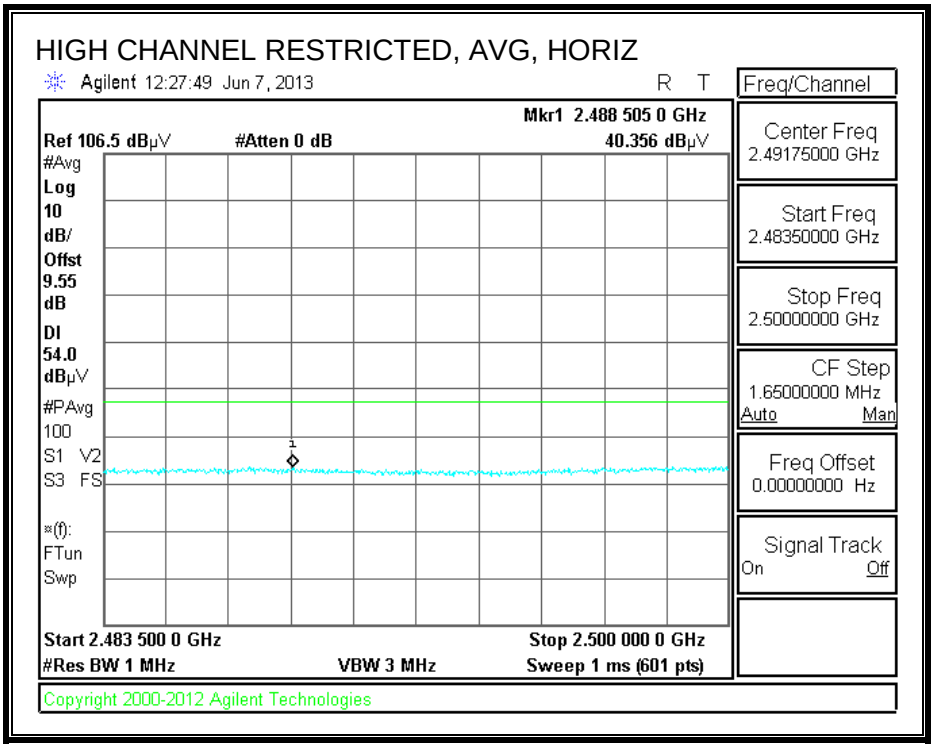
RESTRICTED BANDEDGE (LOW CHANNEL, VERTICAL)



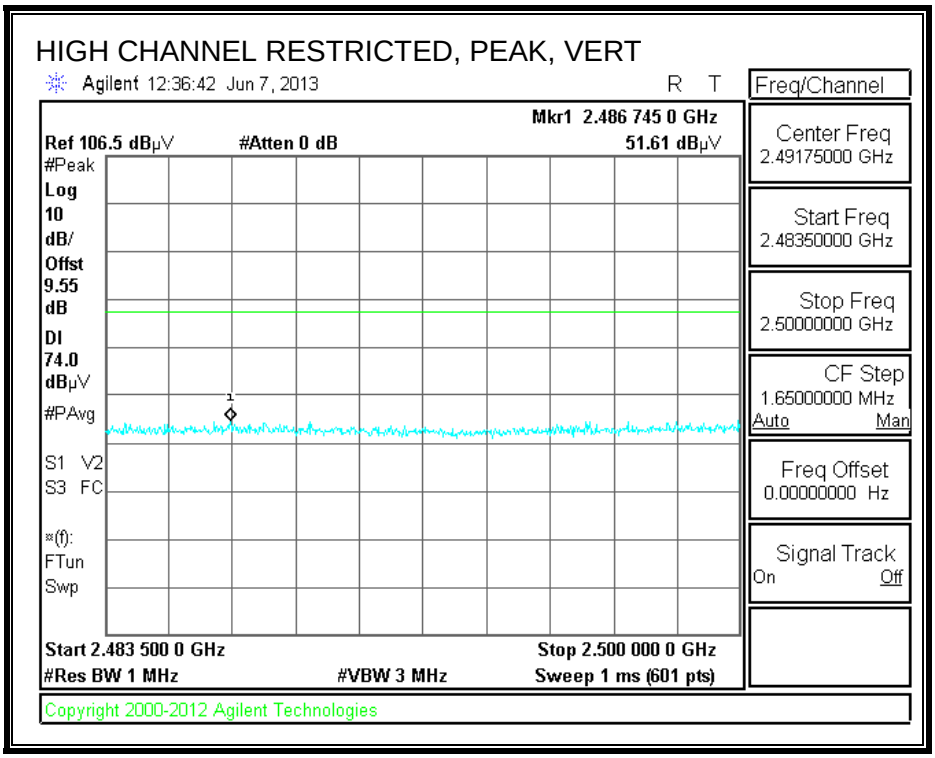


RESTRICTED BANDEDGE (HIGH CHANNEL, HORIZONTAL)

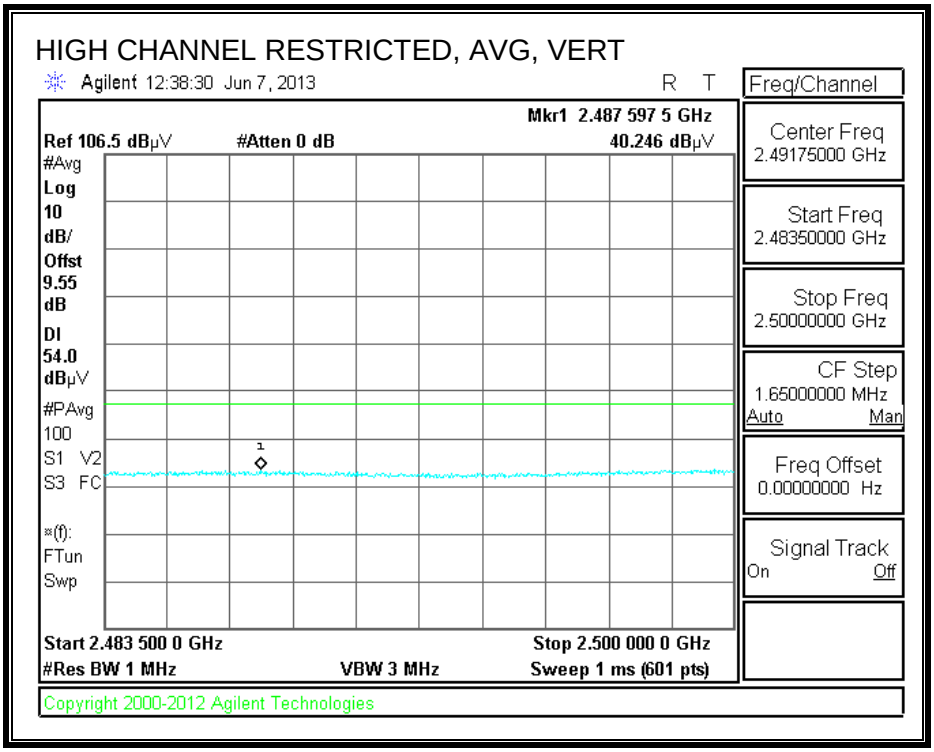




RESTRICTED BANDEDGE (HIGH CHANNEL, VERTICAL)

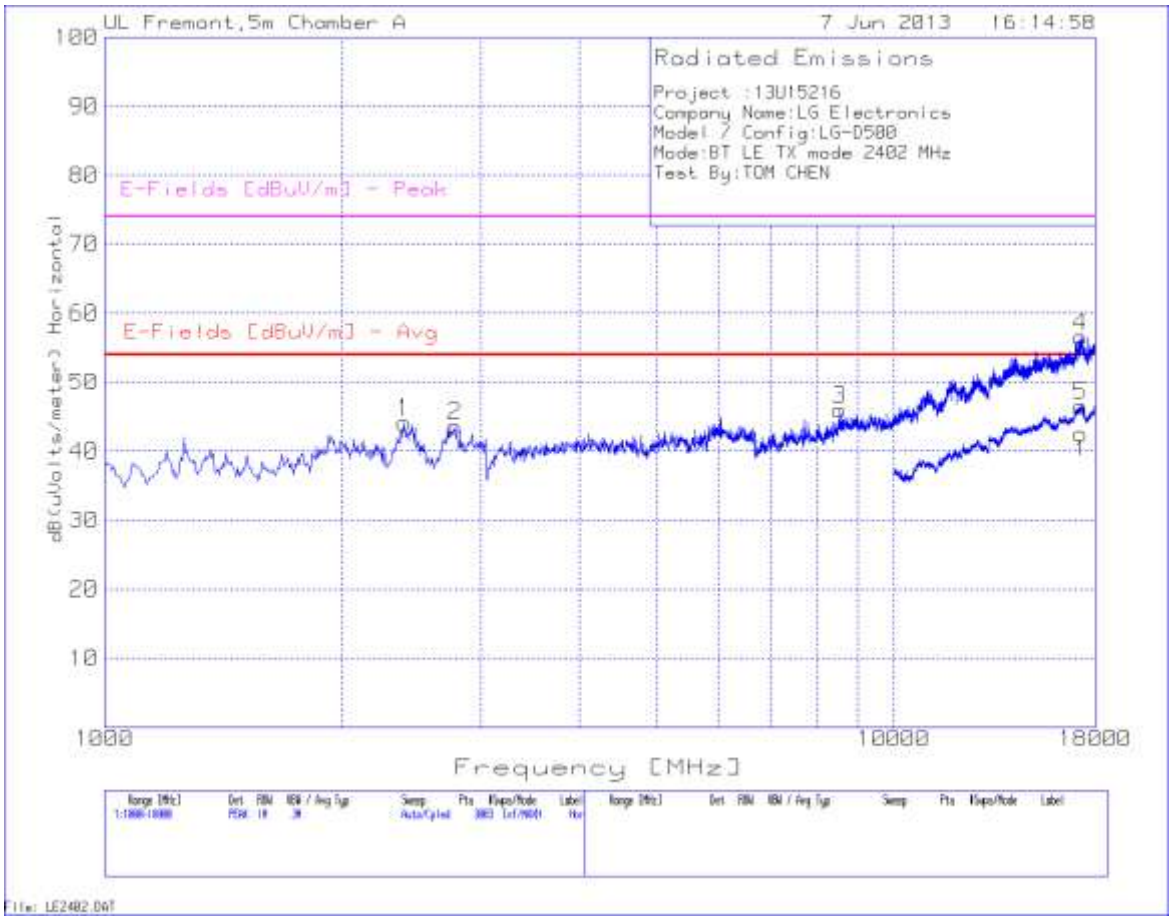


HIGH CHANNEL RESTRICTED, AVG, VERT



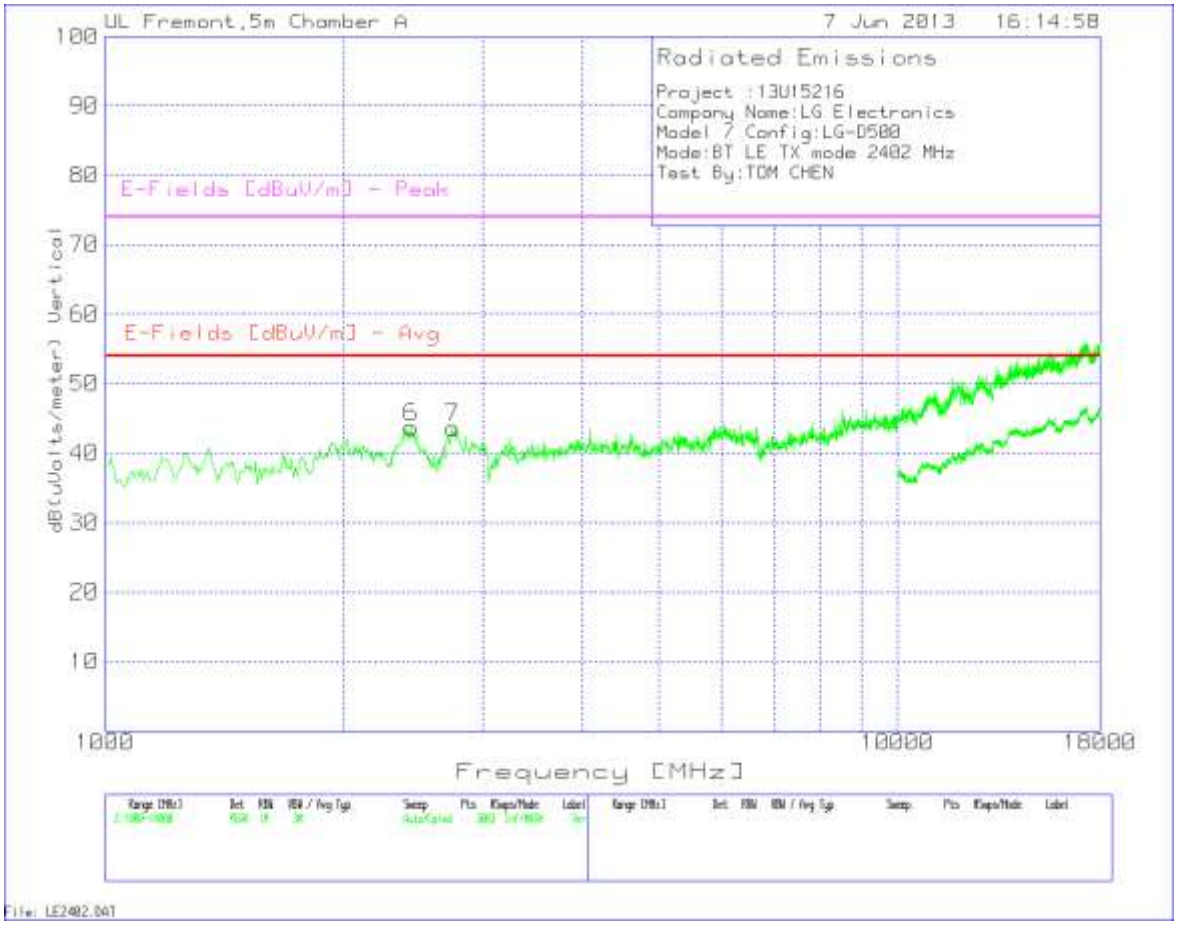
HARMONICS AND SPURIOUS EMISSIONS

LOW CHANNEL H ORIZONTAL PLOT



VERTICAL

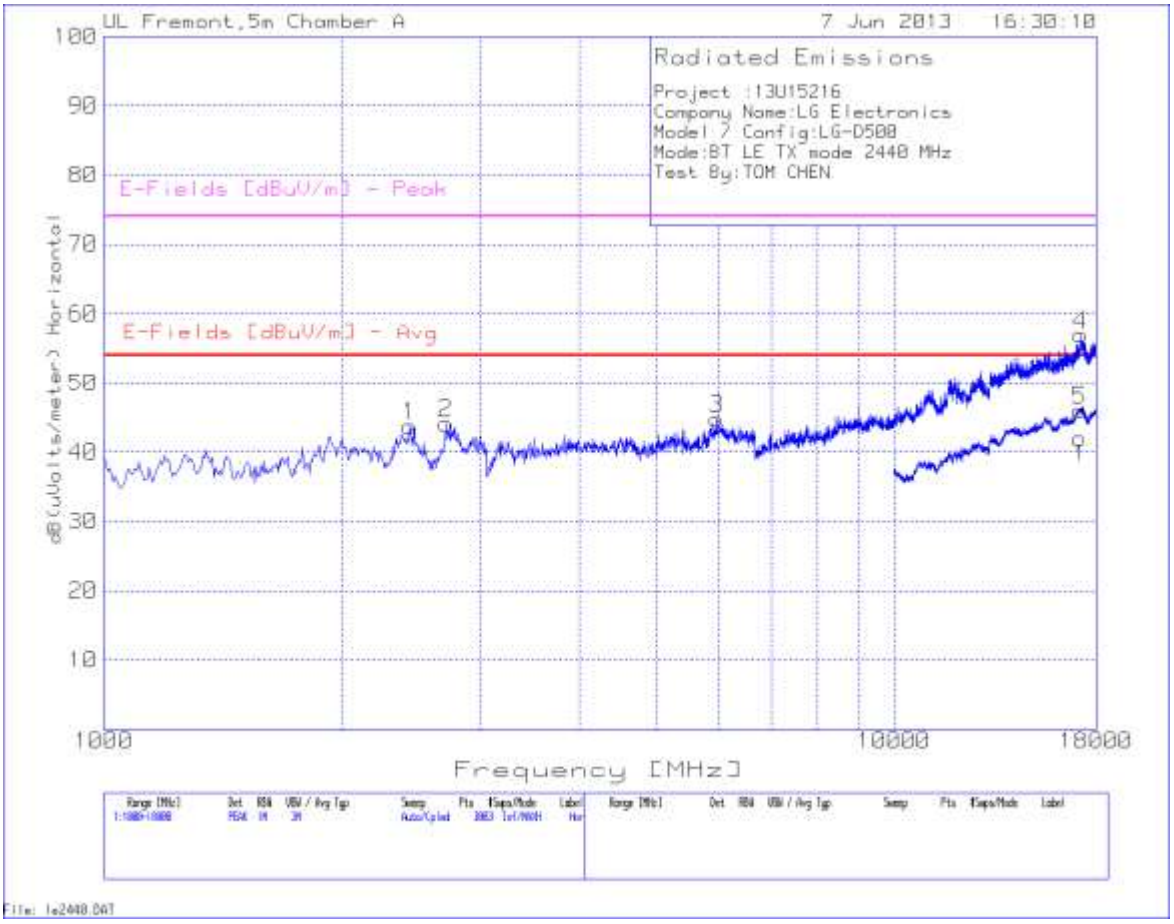
LOW CHANNEL VERTICAL PLOT



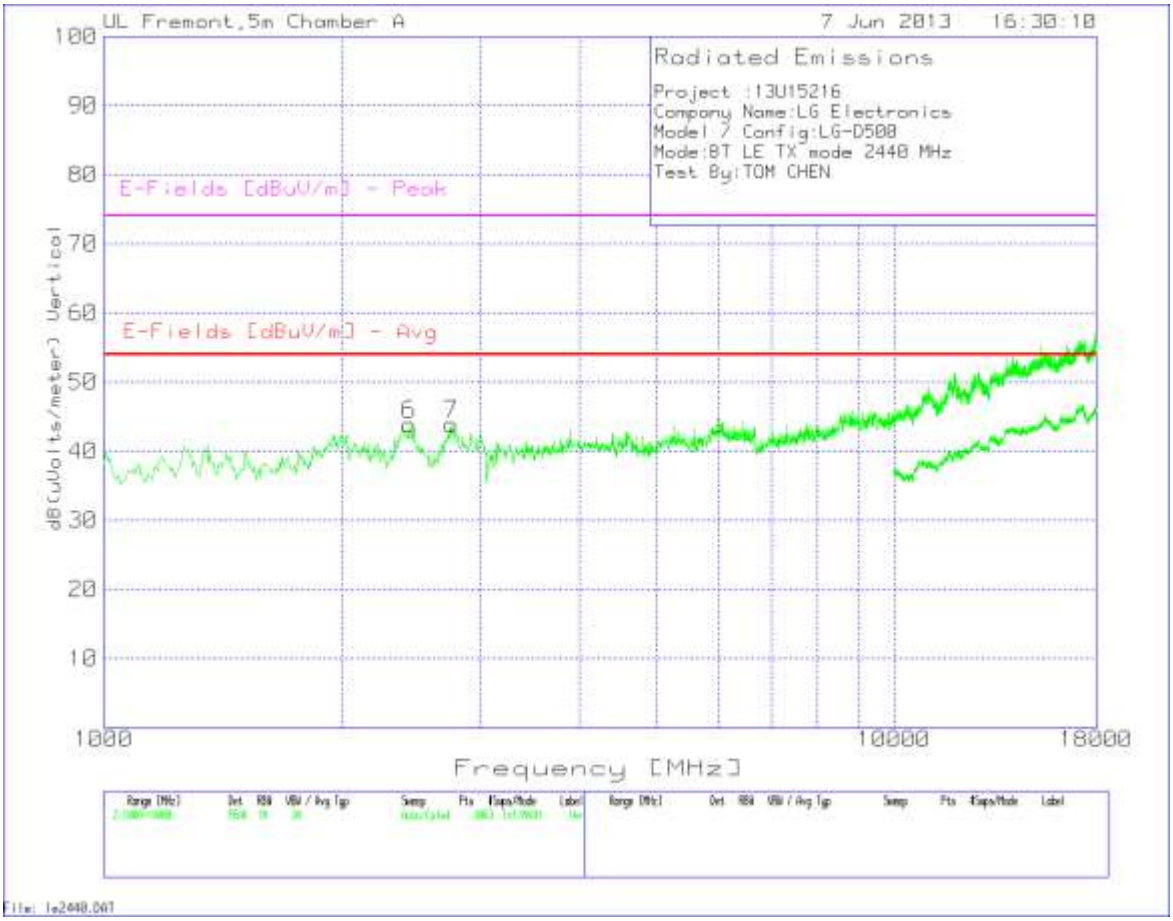
LOW CHANNEL HORIZONTAL AND VERTICAL DATA

Horizontal 1000 - 18000MHz														
Marker No.	Test Frequency	Meter Reading(dBuV)	Detector	T136 Ant Factor [dB/m]	T144 Preamp Gain [dB]	Cable Factor [dB]	T160 BRF [dB]	Corrected Reading dB(uVolts/meter)	E-Fields [dBuV/m] - Avg	Margin (dB)	E-Fields [dBuV/m] - Peak	Margin (dB)	Height [cm]	Polarity
1	2398.734	43.67	PK	32.1	-36.9	4.4	0.9	44.17	-	-	74	-29.83	100	Horz
2	2783.811	42.01	PK	32.6	-36.7	4.8	0.9	43.61	-	-	74	-30.39	100	Horz
3	8548.634	36.27	PK	35.7	-36	9.5	0.5	45.97	-	-	74	-28.03	100	Horz
4	17263.82	35.25	PK	41	-34.3	14.1	0.6	56.65	-	-	74	-17.35	100	Horz
Vertical 1000 - 18000MHz														
Marker No.	Test Frequency	Meter Reading(dBuV)	Detector	T136 Ant Factor [dB/m]	T144 Preamp Gain [dB]	Cable Factor [dB]	T160 BRF [dB]	Corrected Reading dB(uVolts/meter)	E-Fields [dBuV/m] - Avg	Margin (dB)	E-Fields [dBuV/m] - Peak	Margin (dB)	Height [cm]	Polarity
6	2438.374	42.92	PK	32.3	-36.9	4.5	0.9	43.72	-	-	74	-30.28	100	Vert
7	2744.171	41.97	PK	32.7	-36.8	4.8	0.9	43.57	-	-	74	-30.43	100	Vert
Horizontal 10000 - 18000MHz														
Marker No.	Test Frequency	Meter Reading(dBuV)	Detector	T136 Ant Factor [dB/m]	T144 Preamp Gain [dB]	Cable Factor [dB]	T160 BRF [dB]	Corrected Reading dB(uVolts/meter)	E-Fields [dBuV/m] - Avg	Margin (dB)	E-Fields [dBuV/m] - Peak	Margin (dB)	Height [cm]	Polarity
5	17260.37	25.1	PK	41	-34.3	14.1	0.6	46.5	-	-	74	-27.5	100	Horz

MID CHANNEL HORIZONTAL PLOT



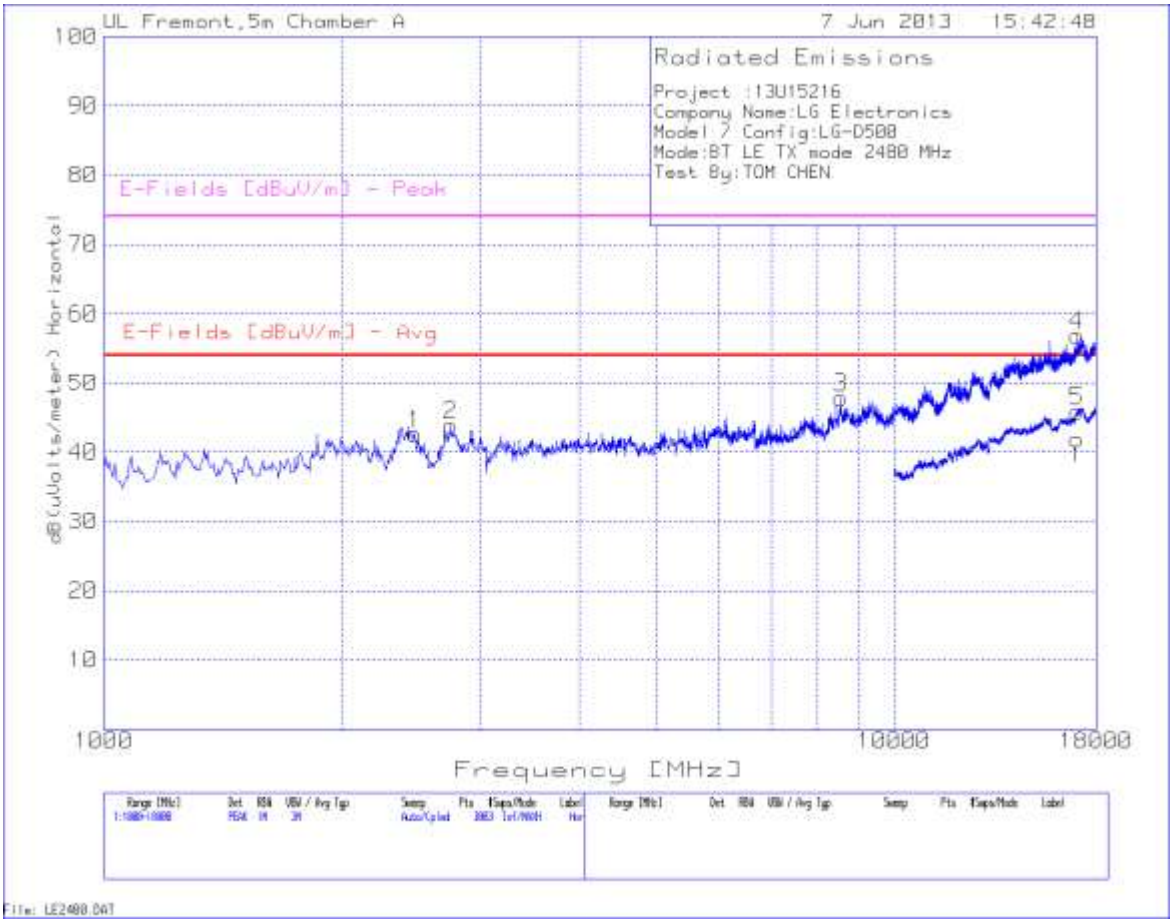
MID CHANNEL VERTICAL PLOT



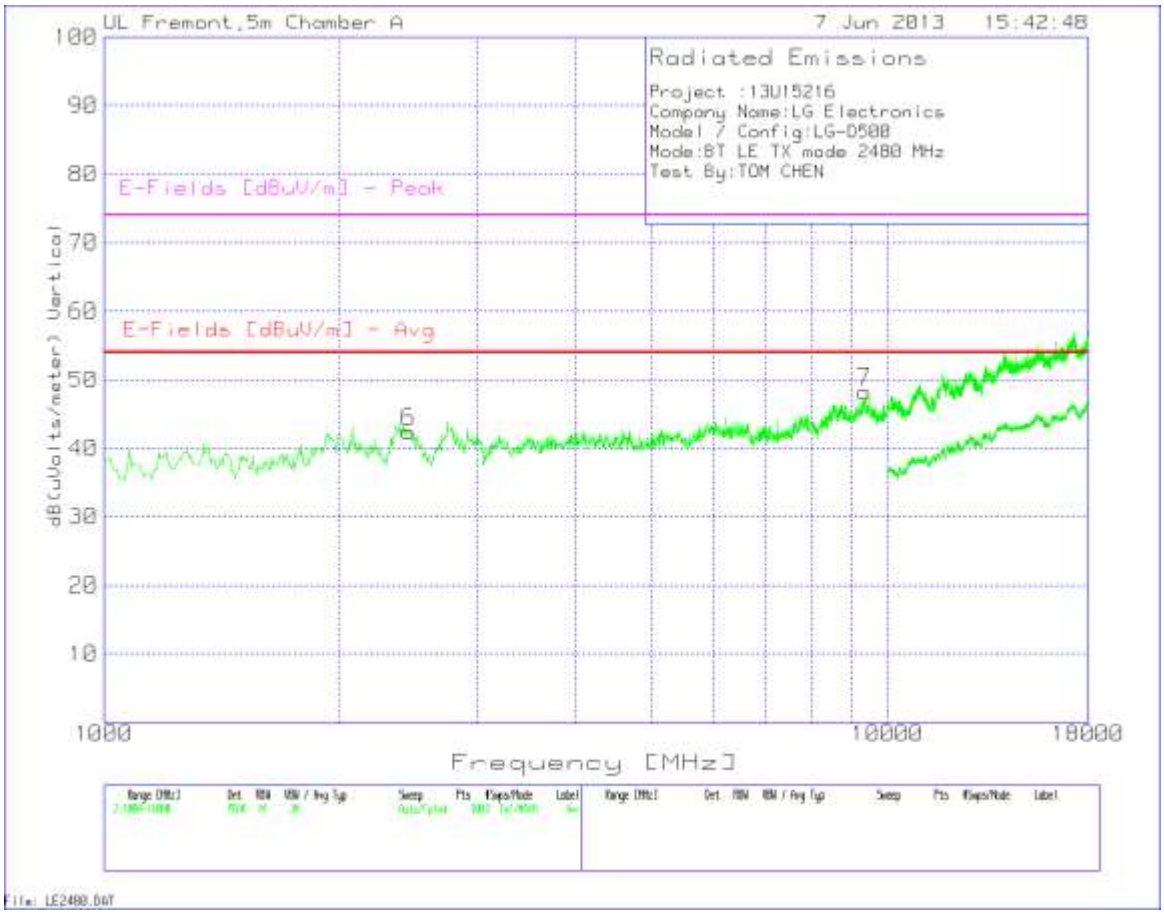
MID CHANNEL HORIZONTAL AND VERTICAL DATA

Horizontal 1000 - 18000MHz															
Marker No.	Test Frequency	Meter Reading(dBuV)	Detector	T136 Ant Factor [dB/m]	T144 Preamp Gain [dB]	Cable Factor [dB]	T160 BRF [dB]	Corrected Reading dB(uVolts/meter)	E-Fields [dBuV/m] - Avg	Margin (dB)	E-Fields [dBuV/m] - Peak	Margin (dB)	Height [cm]	Polarity	
1	2438.374	42.96	PK	32.3	-36.9	4.5	0.9	43.76	-	-	74	-30.24	100	Horz	
2	2710.193	42.61	PK	32.7	-36.8	4.8	0.9	44.21	-	-	74	-29.79	100	Horz	
3	5960.693	37.36	PK	35.2	-35.6	7.7	0.2	44.86	-	-	74	-29.14	100	Horz	
4	17190.21	35.72	PK	40.9	-34.3	14.1	0.5	56.92	-	-	74	-17.08	100	Horz	
Vertical 1000 - 18000MHz															
Marker No.	Test Frequency	Meter Reading(dBuV)	Detector	T136 Ant Factor [dB/m]	T144 Preamp Gain [dB]	Cable Factor [dB]	T160 BRF [dB]	Corrected Reading dB(uVolts/meter)	E-Fields [dBuV/m] - Avg	Margin (dB)	E-Fields [dBuV/m] - Peak	Margin (dB)	Height [cm]	Polarity	
6	2438.374	43.12	PK	32.3	-36.9	4.5	0.9	43.92	-	-	74	-30.08	100	Vert	
7	2755.496	42.41	PK	32.6	-36.8	4.8	0.9	43.91	-	-	74	-30.09	100	Vert	
Horizontal 10000 - 18000MHz															
Marker No.	Test Frequency	Meter Reading(dBuV)	Detector	T136 Ant Factor [dB/m]	T144 Preamp Gain [dB]	Cable Factor [dB]	T160 BRF [dB]	Corrected Reading dB(uVolts/meter)	E-Fields [dBuV/m] - Avg	Margin (dB)	E-Fields [dBuV/m] - Peak	Margin (dB)	Height [cm]	Polarity	
5	17176.41	24.8	PK	40.9	-34.3	14.1	0.5	46	-	-	74	-28	100	Horz	

HIGH CHANNEL HORIZONTAL PLOT



HIGH CHANNEL VERTICAL PLOT



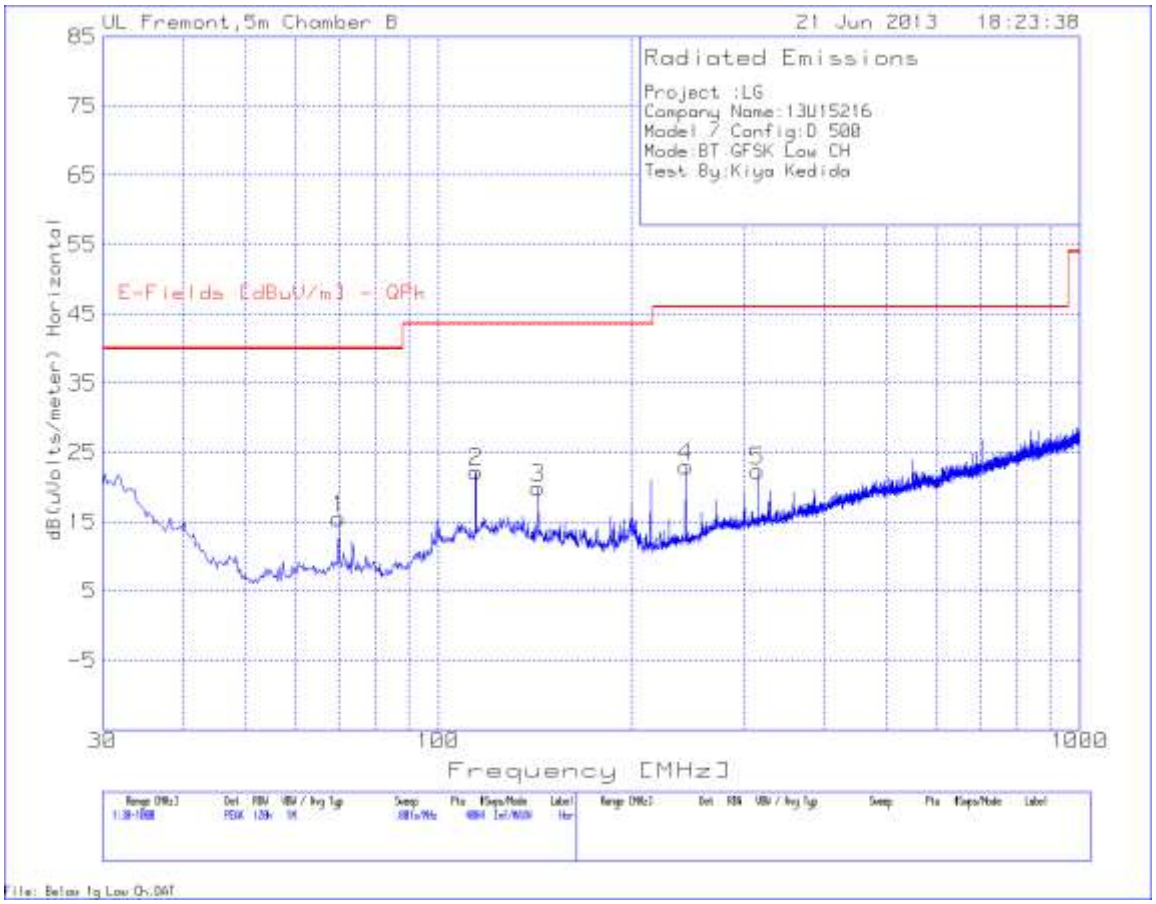
HIGH CHANNEL HORIZONTAL AND VERTICAL DATA

Marker No.	Test Frequency(MHz)	Meter Reading (dBuV)	Detector	T136 Ant Factor [dB/m]	T144 Preamp Gain [dB]	Cable Factor [dB]	T160 BRF [dB]	dB(uVolts/meter)	E-Fields [dBuV/m] - Avg	Margin (dB)	E-Fields [dBuV/m] - Peak	Margin (dB)	Height [cm]	Polarity
Horizontal 1000 - 18000MHz														
*1	2478.015	41.53	PK	32.5	-36.8	4.5	0.9	42.63	-	-	74	-31.37	100	Horz
2	2749.833	42.27	PK	32.7	-36.8	4.8	0.9	43.87	-	-	74	-30.13	100	Horz
3	8559.96	38.27	PK	35.7	-36	9.5	0.4	47.87	-	-	74	-26.13	100	Horz
4	17025.98	35.51	PK	40.9	-34.1	14	0.5	56.81	-	-	74	-17.19	100	Horz
Vertical 1000 - 18000MHz														
*6	2449.7	41.65	PK	32.3	-36.9	4.5	0.9	42.45	-	-	74	-31.55	100	Vert
7	9358.428	37.51	PK	36.4	-36.2	10	0.5	48.21	-	-	74	-25.79	100	Vert
Horizontal 10000 - 18000MHz														
5	17016.49	24.42	PK	40.9	-34.1	14	0.6	45.82	-	-	74	-28.18	100	Horz

7.3. WORST-CASE BELOW 1 GHz

SPURIOUS EMISSIONS 30 TO 1000 MHz (WORST-CASE CONFIGURATION, HORIZONTAL)

HORIZONTAL PLOT

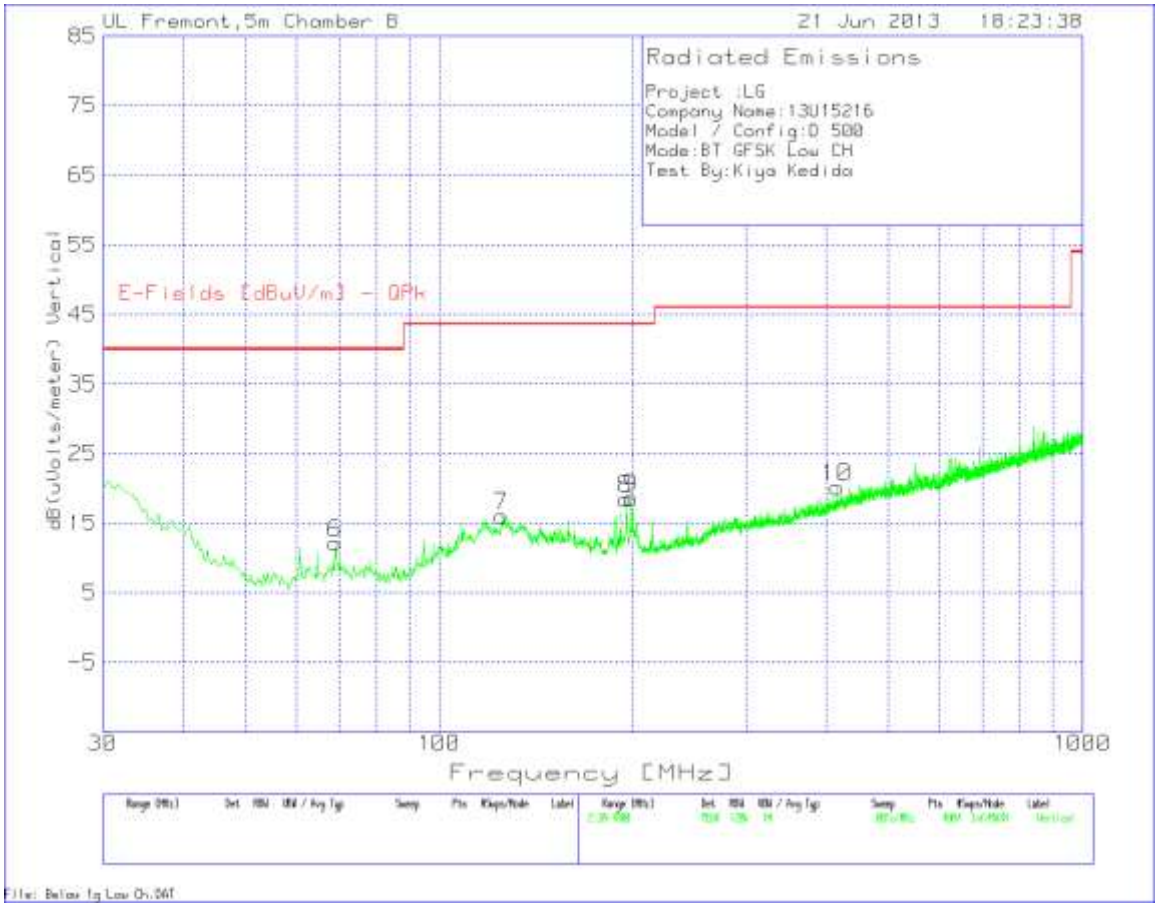


HORIZONTAL DATA

Horizontal 30 - 1000MHz										
Marker No.	Test Frequency	Meter Reading(dBuV)	Detector	T243 Antenna Factor dB/m	T10 preamp/ Cable loss [dB]	Corrected Reading dB(uVolts/meter)	E-Fields [dBuV/m] - QPk	Margin (dB)	Height [cm]	Polarity
1	69.9825	36.29	PK	7.9	-28.7	15.49	40	-24.51	100	Horz
2	114.5691	37.17	PK	13.3	-28.3	22.17	43.52	-21.35	100	Horz
3	143.1626	35.11	PK	12.7	-27.9	19.91	43.52	-23.61	200	Horz
4	243.2401	38.31	PK	11.6	-26.9	23.01	46.02	-23.01	300	Horz
5	314.9663	34.91	PK	13.8	-26.4	22.31	46.02	-23.71	400	Horz

SPURIOUS EMISSIONS 30 TO 1000 MHz (WORST-CASE CONFIGURATION, VERTICAL)

VERTICAL PLOT



VERTICAL DATA

Vertical 30 - 1000MHz										
Marker No.	Test Frequency	Meter Reading(dBuV)	Detector	T243 Antenna Factor dB/m	T10 preamp/ Cable loss [dB]	Corrected Reading dB(uVolts/meter)	E-Fields [dBuV/m] - QPk	Margin (dB)	Height [cm]	Polarity
6	69.0132	33.09	PK	7.8	-28.7	12.19	40	-27.81	200	Vert
7	125.2311	29.96	PK	14.1	-28	16.06	43.52	-27.46	200	Vert
8	195.2611	34.1	PK	11.7	-27.3	18.5	43.52	-25.02	200	Vert
9	198.8958	33.65	PK	12.3	-27.3	18.65	43.52	-24.87	200	Vert
10	415.5284	30.52	PK	16.1	-26.5	20.12	46.02	-25.9	200	Vert